wjert, 2023, Vol. 9, Issue 12, 94-102. Original Article ISSN 2454-695X

World Journal of Engineering Research and Technology
WJERT
www.wjert.org
SJIF Impact Factor: 5.924

ANALYSIS OF POTENTIAL FEED CARRYING CAPACITY FOR DEVELOPMENT OF BUFFALO LIVESTOCK IN JEMBRANA REGENCY

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Article Received on 24/10/2023 **Article Revised on 14/11/2023** **Article Accepted on 04/12/2023**

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ABSTRACT

Mud buffalo (*Bubalus bubalis*) is one of the leading types of livestock in Jembrana Regency which has multiple functions as a cultivator of agricultural land, as a working animal, as a meat producer, and as an object of livestock attraction Makepung. Statistical data shows that the buffalo population in Jembrana Regency in 2020 was 1155 heads, a drastic decrease from 2019 (2068 heads). The biggest component that influences livestock development is the availability of feed. This study aims to analyze the potential carrying capacity of feed for the development of buffalo livestock in Jembrana Regency. Research using the survey method will use samples obtained by purposive sampling of the five districts in Jembrana Regency. Tabulated data will be analyzed to determine the feed Carrying Capacity Index (CCI). The results showed that the carrying capacity of feed for the development of buffalo livestock in Jembrana Regency based on the production of fresh forage was 3,093.40 AU or 2,350.69 AU based on the total dry weight of the forage. The current population of buffaloes is = 854.75 AU. Thus the development of mud buffalo livestock in Jembrana Regency can still be increased by 72.4% or 63.6% respectively for the carrying capacity based on fresh forage and dry weight. The CCI value obtained was 2.75. The CCI value indicates the safety level of forage in an area. CCI value≤ 1 (Very critical); > 1 - 1.5 (critical); > 1.5 – 2 (prone); and >2 (safe). It can be concluded that based on carrying

capacity and feed carrying capacity index, the development of mud buffalo farming in Jembrana Regency is very feasible to be developed from the aspect of feed carrying capacity.

KEYWORDS: Carrying capacity, bearing capacity index, mud buffalo development.

INTRODUCTION

Bali Province has 8 regencies with one city and all of these regencies/city have specific cultural arts creativity that is well known in various parts of the world. In addition to having a variety of dance, painting, sculpture and other crafts, there are also other works of art that feature animal / livestock attractions. One of the attractions that developed in Jembrana Regency is a buffalo race called Makepung buffalo. The utilization of mud buffaloes as Makepung buffaloes is also an effort to conserve buffaloes that have superior performance, are strong and able to run fast. In its development, the introduction of agricultural mechanization technology, and the declining desire of the younger generation to work in agriculture are one of the causes of the decline in the buffalo population in Jembrana regency.

The decline in the buffalo population is also possible due to the narrowing of the land area that is the mainstay as a provider or source of forage. The declining role of buffaloes in agriculture and the transportation of plantation products could also be one of the causes of the decline in the buffalo population in Jembrana Regency. Ultimately, Makepung activities have also declined due to the difficulties of makepung participants with transportation costs, difficulties in obtaining good buffalo breeds, and the availability of feed that must be obtained by buying fresh forage from other places.

In Bali's position as a destination and tourist attraction, the development of Makepung livestock attraction creativity is expected to be able to play a role in the world of tourism through the appearance of livestock attractions that amaze connoisseurs of attraction art. The decline of the Makepung attraction must be solved by understanding the root of the problem that occurred. For this reason, research is directed to look at the ability of the region, especially the existing land with the availability of sustainable forage. Related to this, it is necessary to know the carrying capacity of fodder availability for the development of mud buffalo in Jembrana district in a sustainable manner.

RESEARCH METHODS

A study using the survey method with a descriptive analysis approach was conducted to obtain data on the development and existence of mud buffalo rearing in Jembrana Regency through an assessment of the carrying capacity of forage for buffalo population development. The research was conducted in Jembrana Regency, Bali Province from May to November 2022. Data collected included secondary data related to the research topic. Secondary data was sourced from: a) Centre of Statistic Bureau (BPS) of Jembrana Regency, b) Agriculture and Food Service Office of Jembrana Regency, and c) Literature study of research results published by official institutions. Primary data was obtained through conducting surveys. Research using the survey method used a sample obtained by purposive sampling of five sub-districts in Jembrana Regency. Primary data was obtained from site surveys with direct interviews with buffalo farmers. The number of samples taken was 40 respondents using the Solvin method (Nurdin and Hartati, 2019).

The sampling site was determined using purposive sampling method, which determines the area according to the objectives and certain considerations of the researcher. Sampling using 1x1 meter quadrats determined randomly, at each location 5 snippets were taken. The greenery in the quadrat was cut, then observed for its botanical composition (plant species).

Carrying Capacity Index Method

The minimum feed requirement for ruminants (cattle) per one livestock unit (1 AU) was calculated according to Dijkstra *et al*. (2005) as follows (with modifications): K = 2.5% × 50% × 365 × 250 kg = 1.141 tons digestible dry matter (DDM) /year/AU. Where: K is the minimum feed requirement for 1 (AU) in tons of digestible dry matter (DDM) for one year; 2.5% is the minimum requirement of the amount of forage ration (dry matter) to the body weight of livestock; 50% is the average value of digestibility of various types of plants; 365 is the number of days in 1 year and 250 kg is the live weight of 1 AU. The Livestock Conversion Unit for buffalo is 1.3 (Morgan, 2018).

$$CC\ Fresh\ Forage\ = \frac{Fresh\ Production\ (kg/year)}{Fresh\ forage\ requirement\ (kg/head/year)}$$

$$CC\ DM\ Forage = \frac{DM\ production\ (kg/year)}{DM\ forage\ requirement\ (kg/head/year)}$$

Notes: CC= Carrying capacity; DM= Dry matter

The level of livestock feed security in an area to support the lives of livestock in the area requires an indicator called the Feed Supportability Index (CCI). Feed CCI is calculated to determine the status of the carrying capacity value of an area with the equation according to Ashari *et al*. (1995) as follows:

$$Feed\ CCI\ = \frac{DW\ production\ (kg)}{Total\ Ruminant\ Population\ (AU)\ x\ Buffalo\ Dry\ Matter\ Requirement\ (kg/AU}$$

Description:

CCI = Carrying Capacity Index

DMR = Dry Matter Requirement

TRP = Total Ruminant Population

Feed CCI grading scale:

Feed CCI value ≤ 1 indicates safety level of fodder forage Very critical.

Feed CCI value > 1 - 1.5 indicates fodder forage safety level is critical

Feed CCI value > 1.5 - 2 indicates security level of fodder forage is vulnerable

Feed CCI value > 2 indicates the security level of animal feed forage is safe

RESULTS AND DISCUSSION

An average of 77.5% of farmers kept 2 buffaloes, but 15% of farmers kept more than 6 buffaloes. A closer look at the development of buffalo herds in Jembrana showed that 72.5% of farmers who kept buffaloes had litters after one year, while 7.5% had litters after one year. The results of this study indicate that the enthusiasm of farmers to improve the quality of their animals, especially for the purpose of Makepung, is very high, so various strategies are needed for the development of race-type buffalo (Makepung). However, the buffalo population has decreased, so many farmers do not keep buffaloes due to the high price of a buffalo animal. Observing the above conditions, the involvement of stakeholders is needed to support the development of buffalo population increase in Jembrana. The selection of buffalo breeds for makepung purposes for farmers can be done well because buffaloes in Jembrana Regency have the same somatometry. Somatometric research shows that the main components of size characteristics, namely chest circumference and body length, and body shape characteristics, namely shoulder height and hip height in the measured populations are somatometrically similar (Manurung *et al.*, 2017).

Farmers who use livestock manure into solid fertilizer in a simple way are only 32.5%. The utilization is only for their own needs which are directly used so that the amount of solid

fertilizer production produced cannot be determined. This is also the same for the use of urine, which has not been widely processed into liquid fertilizer for buffalo. In reality in the field, there are not many farmers who process their livestock manure, buffalo faeces are piled up and left to ferment naturally and after it resembles soil, it is then utilized by farmers. Thus, it is very necessary to socialize and enlighten buffalo farmers to apply appropriate technology so that they can produce fertilizer that can be used for their own needs and sold to increase farmers' income.

Figure 1: The Makepung buffalo enclosure is very unique with granite walls. The buffaloes are well cared for and given special treatment.

The types of forage provided were quite diverse and there were 12.5% of farmers who stated that the types of forage eaten varied beyond 5 types of forage, all farmers stated that the forage provided was eaten by their livestock. Most farmers do not provide additional concentrates, only 5% of farmers provide additional concentrates of 2 kg per day. Implications of flushing technology to improve productivity of buffalo in Jembrana.

A total of 42.5% of farmers obtained forage feed not from forage farms, but from rice fields, fallow fields, moorlands, pastures, tree leaves. Farmers can always meet their feed needs even by cutting on rice fields or moorlands, this is also in accordance with the results of research by Suarna *et al*. (2019) who have mapped the location or potential source area for the provision of forage. As many as 40% of farmers have non irrigated dry field above 30 are. To improve the quality of forage, 47.5% of farmers fertilize with organic fertilizers, fertilize

with chemical fertilizers, weeding, and watering. The maintenance of fodder plants to produce quality forage for buffalo feed sources still needs to be improved. Of all farmers who raise buffaloes, only 12.5% of farmers do not give special treatment. For Makepung purposes almost all farmers provide additional feed treatment and there are 12.5% of farmers who provide very special treatment. To develop and increase the capacity of buffalo as a multi-purpose livestock, especially as makepung livestock, the improvement of strengthening pasture management for buffalo is an urgent need in accordance with the opinion of Suarna *et al.* (2017).

The potential area as a livestock area in Jembrana Regency is around 32,421 km2 (3242.1 ha) or around 38.51% of the total area of Jembrana Regency, which consists of rice fields, plantations, moorlands and so on. From the livestock area that is effective as a provider of forage feed that can be utilized by ruminants are fodder plants that exist on rice fields, under plantations or on moorlands, because there are still few farmers who utilize their agricultural land to make forage gardens. Various trees such as *Hibiscus tiliaceus, Ficus sp* jackfruit, king grass elephant grass, setaria grass and native grass can thrive as animal feed.

The current buffalo population data in Jembrana District is as follows:

Male Offspring : 31 heads
Young Males : 123 heads
Adult Males: : 339 heads
Castrated Males : 136 heads
Total: 629 heads

Female Offspring : 45 heads
Young females : 14 heads
Mature females : 95 heads
Total: 154 heads

Total number of males and females: 783 head = 657.5 AU. The AU conversion for buffalo is 1.3 (Morgan, 2018) so the total buffalo population = 854.75 AU.

Fresh forage production in Jembrana Regency is 18347.73 t year^{-1}, while forage production in dry matter is 3486.07 t year^{-1}. Buffalo feed requirement for 1 AU in fresh form is 5.93 t year^{1}, while forage requirement in DDM in Jembrana Regency is 1.483 t year^{-1}. Thus the carrying

capacity of fresh forage is 18347.73: 5.93 = 3,093.40 heads. While the carrying capacity of forage in BKC is 3486.07: 1.483 = 2,350.69 heads. Thus the carrying capacity of land and fresh feed for buffalo still provides a great opportunity for development or increasing the capacity of buffalo livestock by 72.4%, while based on BKC the carrying capacity of buffalo livestock population still provides an opportunity of 63.6%.

Forage production in Jembrana District is 4.301 t ha^{-1} so that total forage production that can be utilized by ruminants in Jembrana District = 3242.1 × 0.25 × 4.301 t = 3486.07 t DW. The dominant types of forage for buffalo feed in Jembrana Regency are: *Ischaenum* sp, *Alysicarpus vaginalis*, *Digitaria* sp., *Lercia Hexandra*, *Cynodon dactylon*, Panicum repens, *Brachiaria reptans*, *Imperata cylindrica*, *Cyperus rotundus*, and several types of weeds.

Minimum feed requirement for 1 (AU) in tons of digestible dry matter (DDM) for one year = 1.483 tons DDM/year/AU. The feed requirement for buffalo for a year is = 854.75 × 1.483 t BKC = 1267.594 t $year^{-1}$ DDM. Thus the CCI value obtained is: 3486,068: 1267,594 = 2,75. This CCI value is higher than the CCI value obtained from the research of Dotulung *et al*. (2021) of 1.6 and the research of Prasetyo *et al.* (2019) obtained an CCI value of up to 3.8. Both studies were conducted to determine the CCI of feed for cattle. Research conducted by Suarna *et al*. (2014) on the carrying capacity of feed for ruminant farms in Gianyar Regency, and research by Suarna *et al*. (2016) on feed carrying capacity for taro white cattle showed safe feed availability conditions. However, competition between taro white cattle and Bali cattle, which both require forage, is increasing along with the increasing livestock population in the area.

CONCLUSIONS AND SUGGESTIONS

Conclusion

The potential and distribution of land carrying capacity in supporting the availability of animal feed is very possible for the development of mud buffalo. The existence of buffalo livestock is still supported by the cultural wisdom of Makepung which is very popular with the people of Jembrana. The CCI value obtained is 2.75. The safety level of forage is considered safe.

Suggestion

Suggestions that can be conveyed related to the results of this study are that a breakthrough needs to be made so that the Makepung tradition can reach a wider tourism marketing

destination. There are obstacles in marketing Makepung tourism products to foreign tourists. The utilization of buffalo cattle for the purpose of providing meat and working cattle packaged with instruments for livestock attraction for tourism should be considered for improvement.

ACKNOWLEDGMENTS

The authors would like to thank the Ministry of Education, Culture, Research, and Technology, for facilitating the funding of this research through DIPA PNBP Udayana University TA-2022 in accordance with the Research Implementation Assignment Agreement Letter Number: B/78.895/UN14.4.A/PT.01.03/2022, dated April 19, 2022. Thanks also to the Rector of Udayana University, Chairperson of LPPM Udayana University and to all Staff of Environment and Tropical Forage Research Group of Udayana University of Bali for their help and support.

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